

OAKLAND POLICE DEPARTMENT

Surveillance Impact Use Report for the Gunshot Location Detection System

1. Information Describing the Gunshot Location Detection (GLD) System and How It Works

The Oakland Police Department (OPD)'s GLD system employs acoustic sensors which are strategically placed in specified areas. Currently, OPD contracts with ShotSpotter, Inc., the creator of the ShotSpotter® Flex™ system "Shotspotter." The GLD system sensors are designed to record and recognize gunshots based on their high-frequency impulsive sound and acoustical signature (120 decibels or higher pitch). The utilization of multiple sensors allows the system capture the sound and acoustical signature from different angles (minimum of three sensors) and thus to pinpoint a gunfire location; the sensors then send the audio recording and location data to the "Shotspotter Cloud" for gunshot verification; Shotspotter uses computer-learning algorithms and then human analysts (two phase authentication) to verify gunshot occurrences. Verified gunshots and related information are then quickly sent from the Shotspotter Cloud to the OPD Communications Division and police vehicle terminals (within 60 seconds; 29 seconds on average) so that Communications may notify responding personnel (and personnel can use vehicle computers) of where gunshots were recently fired.

The GLD System also consists of a cloud-based portal accessible via patrol and OPD computers, and desktop applications. Officers or other authorized personnel can receive real-time gunshot notification when logged into the system (in addition to receiving notification from OPD Communications). Authorized personnel (crime analysts) use the desktop applications that connect to the Shotspotter system for more in-depth gunshot pattern analysis.

2. Proposed Purpose

Hundreds of gunshots occur each month in Oakland; in September 2018 alone the system logged 395 total incidents (275 multiple gunshots, 92 single gunshots, and 28 possible gunshots). Fortunately, many gunshots do not lead to actual gunshot victims, although sometimes there are gunshot victims. The gunshot data suggests that when there are witnesses who call 911 to report gunshots, the locations provided by witnesses are often inaccurate. Also, witnesses for whatever reason do not always notify OPD of their

occurrence; other times there are witnesses. The GLD system allows OPD to become aware in real-time of gunshots when they occur – where they actually occur - when within range of installed GLD system sensors. OPD Communications receive verified gunshot information and can notify officers to respond and officers can directly receive gunshot notifications from their vehicle terminals. Personnel can better respond to gunshot activity, and respond to possible armed individuals as well as to possible gunshot victims through this important real-time data.

3. Locations Where, and Situations in which GLD System may be deployed or utilized.

OPD has contracted with Shotspotter to install GLD sensors in different areas (phases) in several parts of the City. The total coverage area for the current ShotSpotter system comprises 15.38 square miles or approximately 25 percent of the City. OPD has chosen to install the sensors in areas most prone to gunshots based upon historical data. Many areas in East and West Oakland now benefit from the GLD system. Officers and authorized personnel after receiving OPD training are authorized to access the GLD system in patrol vehicles throughout the City.

4. Impact

GLD SYSTEM technology helps OPD personnel to leverage their street presence and vehicle mobility to respond directly to gunshots without waiting for the public to call 911 and report gunshots. The GLD system helps OPD both as a crime fighting tool and as a community partnership building resource. The GLD system has two major components: 1) Gunshot Notifications (ShotSpotter Flex™ Alert); and 2) Investigative Component (ShotSpotter Flex™ Investigator Portal). The ShotSpotter Flex instantly notifies officers (logged into the system) of gunshots in progress with real-time data delivered to the OPD Communications Section and patrol vehicles. This service enhances officer safety and effectiveness through:

- Real-time access to maps of shooting locations and gunshot audio;
- Actionable intelligence detailing the number of shooters and the number of shots fired;
- Pinpointing precise locations for first responders to aid victims, search for evidence, and to be able to know where to find witnesses; and
- real-time email notifications of detected activations with shooting location maps and associated audio.

OPD personnel can also utilize GLD system data to know where exactly to attempt to engage neighbors in areas where shots are being fired. Officers use this information to ask community members what they know related to

shots being fired. These initial meetings related to gunfire also serve as starting points for greater contact between residents and OPD officers.

The GLD (Shotspotter) Investigator Portal (IP) provides the OPD Criminal Investigations Division (CID) with historical data for gunshot spatial analysis. This analysis provides CID analysts with a tool for the development of proactive policing strategies - directed patrols can focus in areas where gun fire is habitually detected.

Historic gun crime data (e.g. homicides and strong-arm robberies) already provide OPD personnel with data that suggests where future gun-related crimes are likely to occur – OPD uses this data to focus resources towards high priority areas for a greater police presence. The GLD system provides responding personnel with much more exact data. Therefore, the GLD system does not directly lead to a broader policing footprint. Rather, the GLD system allows personnel to use more intelligence-based policing and respond directly to exact areas where police are needed to find the individuals engaged in gun crimes as well as to respond to the victims of such crimes. The GLD system actually helps OPD to lessen the police patrol presence in parts of the city that already receive a greater policing footprint, by responding more to exact locations that need an immediate police response.

GLD system recordings may record human voices even though the system is calibrated to focus on high-pitch gun shot frequencies. The sensors are constantly recording and then deleting the data unless triggered to send the data to Shotspotter HQ for analysis. They sensors truncate the data to a few seconds before to a few seconds after the gunshot sound incident – otherwise street atmosphere sounds are deleted.

OPD cannot draw direct causal relationships between the GLD system and gun crime activity. However, OPD's Ceasefire Unit (focused on diminishing the prevalence of gunshot activity) sees correlations between the use of the GLD system and gunshot activity; in 2014 there were 420 incidents of Assault with a firearm (criminal code 245(a)(2)PC)); 2015 saw 342 incidents; 2016 saw 331 incidents; 2017 saw 281 incidents and 2018 saw 277 incidents – a consistent five year decrease.

5. Mitigations

OPD, in partnership with Shotspotter (GLD system provider) has developed protocols to ensure that the GLD system does not overly burden the public's right to privacy. OPD DEPARTMENTAL GENERAL ORDER (DGO) "I-20 Gunshot Location Detection System" Section B "General Guidelines" explains that:

- Only authorized users may access the GLD system;
- No one may access the system without training;
- Only specifically authorized personnel authorized by the Chief or Chief-

designee (e.g. personnel with OPD's Ceasefire Unit and CID crime analysts) will have access to historical GLD system data via desktop GLD system applications.

(DGO) "DGO I-20 Section D "Training" explains that:

Training requirements for employees authorized to use the GLD system include completion of training by the GLD System Coordinator or appropriate subject matter experts as designated by OPD. Such training shall include:

- Applicable federal and state law
- Applicable policy
- Memoranda of understanding
- Functionality of equipment
- Accessing data
- Safeguarding password information and data
- Sharing of data
- Reporting breaches
- Implementing post-breach procedures

Section 4 above (Impact) explains that the GLD system recordings, "may record human voices even though the system is calibrated to focus on high-pitch gunshot frequencies." The Impact Section explains that the GLD System only records a few seconds related to the actual gunshot. Shotspotter sensors send sound files consisting of two seconds before the acoustic incident and up to four seconds after the incident. The system can only send these short sound segments from sensors to the Shotspotter Cloud when three or more sensors record the impulsive sounds indicative of gunshot sound signatures. This hard-coded function of the GLD system helps to ensure that only very short segments of human voice are ultimately recorded and archived into the GLD system. Furthermore, most sensors are placed approximately 30 feet above ground level to maximize sound triangulation; at this altitude the sensors can only record limited street-level human voice sounds; Furthermore, the one-way sound transmission from the sensors to the Shotspotter Cloud limits the possibility of recording actual conversations; Shotspotter and OPD only receive audio recordings of the impulsive sounds two seconds prior and up to four seconds after the impulsive sound event.

The sensors are constantly recording a total of 72 hours, and then deleting the data unless triggered to send the data to the Shotspotter Cloud for analysis – the 72 hour buffer allows OPD to request data within the 72 limit in cases where gunshots have been registered and there is a need to verify if there were other gunshots prior to the authenticated event; Shotspotter policy stipulates that only specific support engineers can use a technology to access the 72 buffer in the sensors to retrieve prior recorded data and search for other gunshot impulsive sound events (this feature is useful when CID

investigators need to search for previous gunshots). The sensors truncate the data to a few seconds before to a few seconds after the gunshot sound incident – otherwise street atmosphere sounds are deleted.

6. Data Types and Sources

The GLD system uses acoustical digital data file recordings (.wav files) to send to the Shotspotter Cloud for gunshot frequency verification. Verified gunshot recordings stored on HQ servers can be reviewed by OPD personnel on desktop applications.

7. Data Security

OPD takes data security seriously and safeguards GLD System data by both procedural and technological means. The mitigation section above explains that only authorized and trained personnel will be permitted access to the GLD system. The system always requires user and password ID for login. Furthermore, as explained in the Mitigation Section above, only personnel specifically designated by the Chief or Chief-designee have access to the GLD system desktop applications which provide access to any historical downloadable data.

The GLD technology itself provides many layers of data security. The sensors detect loud high-pitch impulsive sounds; only when such sounds are recorded are audio files captured and sent to HQ and then to OPD; other street sound recordings such as human conversations are thus constantly deleted – audio is deleted from sensors' buffers and permanently deleted within 72 hours. The sensors cannot live stream audio – only audio connected to gunshot-type audio signatures are maintained for data retention. Furthermore, there is no way to tag any conversation that is unintentionally recorded when connected to a gunshot. OPD authorized personnel may find that a voice has been recorded along with gunshot sounds but such voice data is only associated with the actual gunshot data.

8. Costs

OPD entered into the original contract with SST, Inc. in 2006 (Resolution No. 80075 C.M.S.) for the purposes of piloting the gunshot detection system. This initial contract authorized installation of the Shotspotter GLD system in one area of East Oakland for approximately \$70,000 per year. In October 2011, the City entered into a new contract with SST, Inc (Shotspotter for approximately \$84,000 per year. The size and scope of the areas covered by the GLD system has increased such that that system now has 13.68 square miles covered (see Section 3 Areas Covered above). The size and scope results in a large cost – in 2016 the City entered into a new contract for an amount not to exceed \$1,637,188 for a three-year (2018-2021) period for the

expanded three-phase area.

9. Alternatives Considered

OPD officers and investigators rely primarily on traditional members of the public to report gunshot crimes whether or not there are associated gunshot victims. Members of the public, when they witness or hear gunshots (and if they choose to report incidents) often report inaccurate locations. GLD systems have revolutionized real-time intelligence. OPD believes that there is no alternative to a modern GLD system other than having exponentially greater numbers of sworn personnel covering many areas throughout the City and/or using more intrusive forms of recording equipment. Other alternatives would be to continue to rely on less accurate information provided by the public and to have less information about real-time gunshots. These alternatives are not considered useful given the thousands of gunshot incidents which continue to occur each year in Oakland.

10. Track Record of Other Entities

Shotspotter states that it's system is now used in over 90 cities throughout the United States. Cities plagued by high levels of gunshot activity such as Chicago, Washington D.C., Chicago, with the highest municipal homicide rate, cites drops of over 40% in areas where the system has been deployed. Fresno, CA began using the system in 2015, covering 12 square miles of the City. The Pittsburgh, PA Police Department cite evidence that their system has helped them respond to shooting victims in time to rush victims to hospitals and save their lives¹. The San Diego Police Department also cite evidence that the system allows them to respond much quicker to gunshots in the four areas with systems in which gunshots historically occur more frequently². Cincinnati PD cite ShotSpotter as well as increased gun tracing for 47% 2018 decrease in gunshot activity³.

¹ <https://www.marketscreener.com/SHOTSPOTTER-INC-35742435/news/Shotspotter-Pittsburgh-police-say-gunshot-sensing-system-helps-save-lives-solve-crimes-26166807/>

² <https://www.nbcsandiego.com/investigations/SDPD-Gun-Shot-Detection-Technology-Led-To-Quicker-Response-Times-449630173.html>

³ <https://www.wcpo.com/news/crime/shootings-down-nearly-50-percent-in-cincinnati-this-year-police-say>